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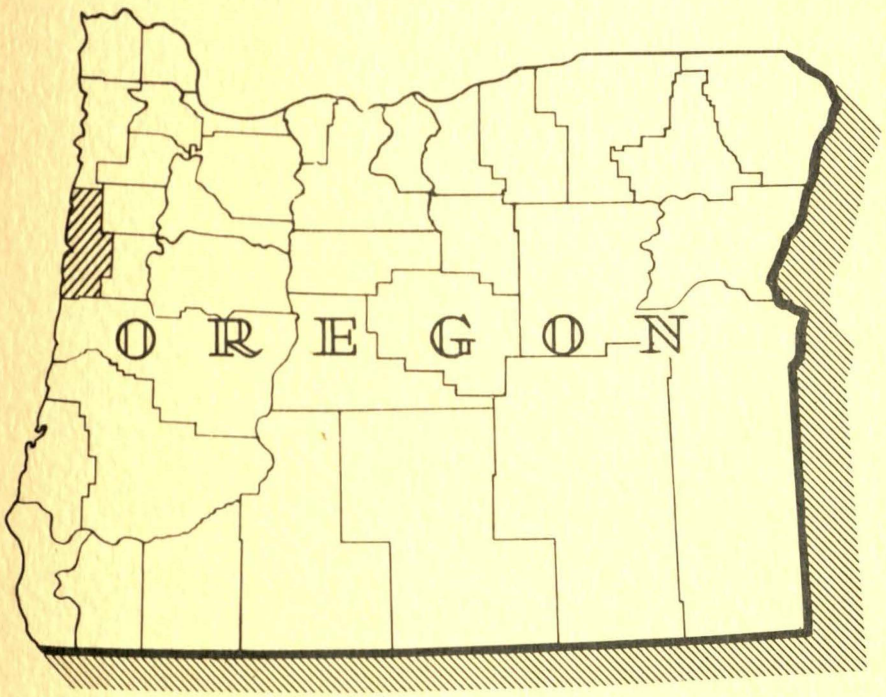
FOREST STATISTICS FOR LINCOLN COUNTY, OREGON

FOREST SURVEY REPORT NO. 129



PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

PORTLAND, OREGON

OCTOBER 1957

PREPARED BY THE DIVISION OF FOREST ECONOMICS RESEARCH

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1/ Acknowledgment is made of cooperation from the staff of the Siuslaw National Forest who participated in the measurement of field data, and from public and private agencies in furnishing cutting and ownership records.

FOREST STATISTICS

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LINCOLN COUNTY, OREGON

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Pacific Northwest Forest and Range Experiment Station
U. S. Department of Agriculture Forest Service

R. W. Cowlin, Director
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FOREWORD

This publication summarizes in statistical form the results of the second reinventory of the forests of Lincoln County, Oregon, conducted in 1955. This reinventory is a part of the maintenance phase of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other products on them, to ascertain rates of forest growth and depletion, to estimate present consumption of timber products and to analyze and make available in reports survey information needed in the formulation of forest policies and programs.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey, the forests of Lincoln County were inventoried in 1931 and 1932. A statistical report "Forest Statistics for Lincoln County, Oregon" and a detailed forest type map on a scale of 1 inch to the mile were released a short time later. In 1942 a reinventory of the county's forests was made to bring the statistical data and forest type map up to date. Revision of the data and map was based on field examination and recognized all changes in forest type acreages and timber volumes due to logging and fire, restocking of cut- and burned-over areas, and transfer of landownership since the original inventory. A second statistical report also entitled "Forest Statistics for Lincoln County, Oregon" and a revised type map were released in March, 1944. During the 1955 reinventory the type map was again revised and is available on a scale of either 1 or 2 inches to the mile1/.

1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, P. O. Box 4059, Portland 8, Oregon.

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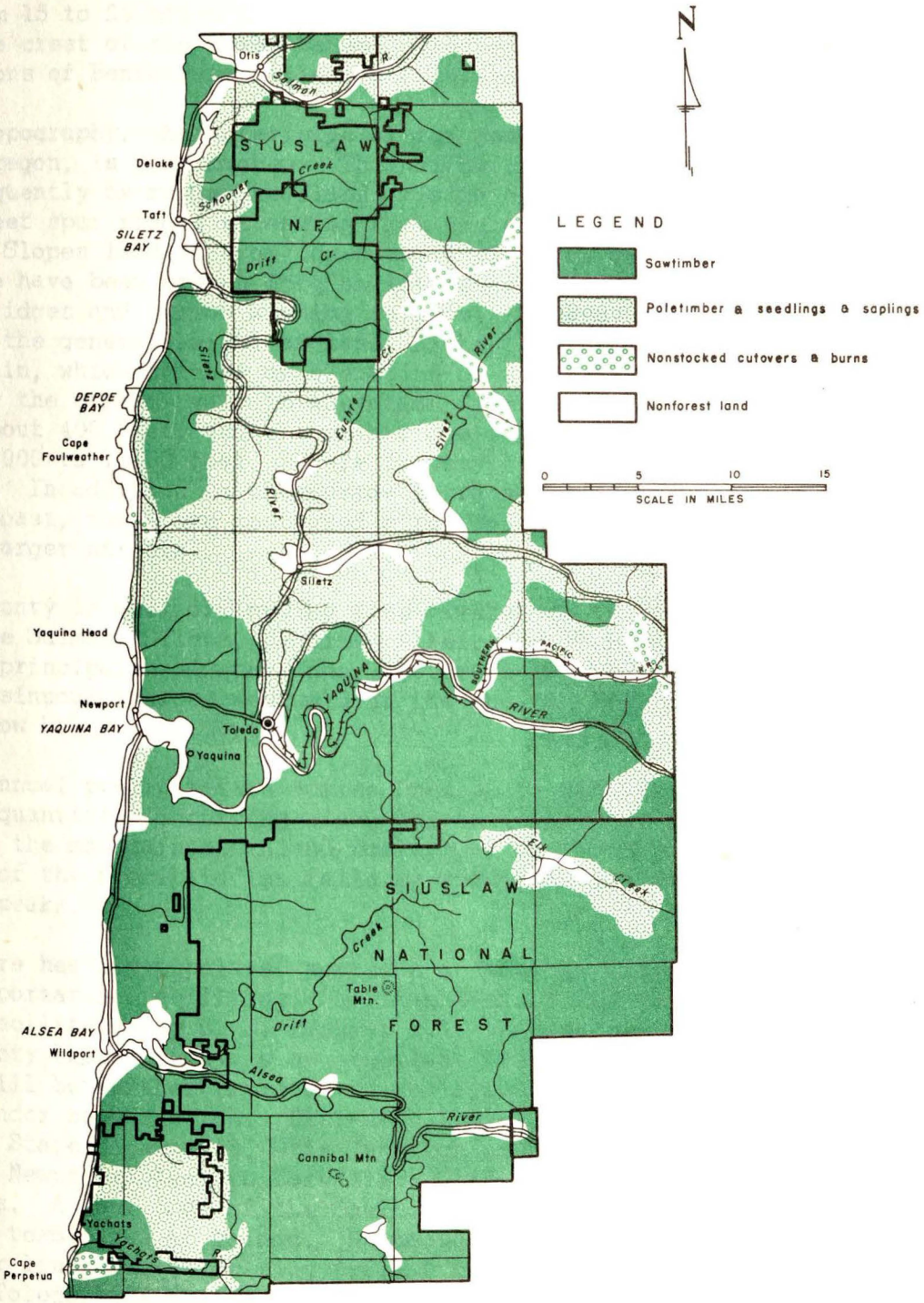
FIGURE I

FOREST STAND-SIZE AND CONDITION CLASSES

LINCOLN COUNTY, OREGON

1955



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DESCRIPTION OF THE COUNTY

Lincoln County, an irregular rectangle of 626,890 acres, is located on the Oregon coast some 80 miles south of the Columbia River. It has a coastal frontage on the Pacific Ocean of some 60 miles and ranges from 15 to 25 miles in width. The eastern boundary in general follows the crest of the Coast Range. The county was created in 1893 from portions of Benton and Tillamook Counties.

The topography, characteristic of the western slopes of the Coast Range in Oregon, is very broken. The narrow coastal plain is interrupted frequently by rugged headlands rising abruptly from the ocean shore to meet spur ridges extending from the mountainous country to the east. Slopes leading from the coastal plain to the crest of the Coast Range have been broken into an intricate labyrinth of rounded hills and ridges and narrow winding valleys. Several rounded peaks rise above the general height of land, highest of which is Saddleback Mountain, which reaches an elevation of 3,359 feet. Bottom lands along the streams vary in elevation from a few feet above sea level to about 400 feet, and the main ridge tops reach heights varying from 1,000 to 1,500 feet. There is very little level land in the county. In addition to the marine terraces and tidal flats along the coast, there are scattered stretches of narrow bottom land along the larger streams.

The county is well drained by five rivers and their many tributaries. The Salmon, Siletz, Yaquina, Alsea, and Yachats Rivers all have their principal headwaters near the crest of the Coast Range, and follow sinuous courses westward to the ocean. Each has formed a small shallow bay at its mouth.

Mean annual precipitation varies from 50 to upwards of 80 inches, the lesser quantities occurring along the coast and the greater quantities over the mountainous inland portion of the county. Only a small part of the precipitation falls as snow and that upon the higher ridges and peaks.

The more heavily populated portions of Lincoln County have adequate transportation facilities. North-and-south travel within the county is facilitated by U. S. Highway 101. Within the confines of Lincoln County this highway is an excellent high-speed, all-weather road, and will be further improved by realignment and relocation projects now under construction. East-west travel within the county is provided by State Highway 18, Otis Junction to McMinnville; U. S. Highway 20, Newport-Toledo to Corvallis; State Highway 34, Waldport to Corvallis. A spur line of the Southern Pacific Railroad from McMinnville terminates at Toledo. No passenger service is offered but the spur line does a thriving freight business serving a large sawmill at Toledo, and the several smaller mills in the Toledo-Newport area.

Most of the wealth of the county is based on its forest resources. In 1954, industrial payrolls amounted to almost 14 million dollars. Of this total, 9.7 million dollars came from forest products industries2/.

The population in 1950 numbered 21,308. This compares with 1930 and 1940 estimates of 9,903 and 14,549 respectively. The population is primarily rural with 15 percent classed as urban and 85 percent rural farm and nonfarm. In the 1950 census only one city in the county, Newport (population 3,241), was listed as having over 2,500 inhabitants. Toledo (1950 population of 2,323) has since passed the 2,500 mark and in 1954 had an estimated population of 2,749.

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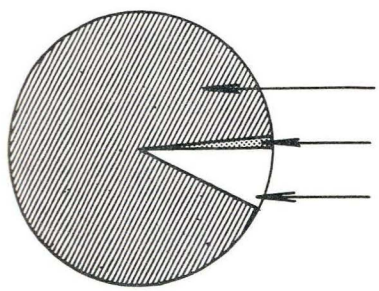
2/ From statistics issued by the State Unemployment Compensation Commission, Division of Research and Statistics.

SIGNIFICANT FINDINGS IN THE FOREST INVENTORY

LAND CLASSIFICATION

Lincoln County is predominantly a forest county. The nonforest land occurs chiefly as agricultural land along the larger streams and on the coastal plain, or as tidelands, beach, residential, or resort areas along the coast.

Lands in agricultural use account for 77 percent of the nonforest area. Dairy and livestock farms are the principal forms of agriculture. In 1949 the value of products from these types of farms represented 72 percent of the total value of all farm products sold in the county.



CLASS	THOUSAND ACRES	PERCENT
COMMERCIAL FOREST	578	92
NONCOMMERCIAL FOREST	1/	1
NONFOREST	49	7
TOTAL	627	100

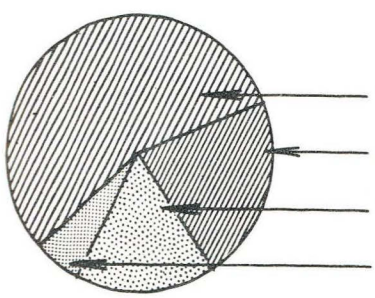
1/ Less than 500 acres.

Noncommercial forest land consists of 470 acres of productive but reserved forest land set aside by the State as parks along the coast.

COMMERCIAL FOREST LAND AREA

Major Types

The three major forest types in Lincoln County are Douglas-fir, hemlock-Sitka spruce, and hardwoods.



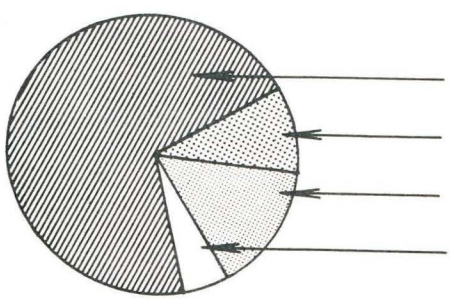
MAJOR TYPE	THOUSAND ACRES	PERCENT
DOUGLAS-FIR	326	56
HEMLOCK-SITKA SPRUCE	122	21
HARDWOODS	97	17
OTHER	33	6
TOTAL	578	100

Generally speaking, the forest lands of Lincoln County may be divided into two zones. The first of these zones occupies the area along the coast and extends 4 to 6 miles inland. In this zone hemlock-spruce types predominate. Pure stands of each of these species also occur in this zone, but more often the stands are mixed. On the upper slopes and ridges in this zone hemlock is the major species, while on the lower slopes spruce predominates. The bottoms and the middle slopes in this zone are frequently in hardwood sawtimber types with red alder the principal species. Although red alder hardwood types are scattered throughout the county, it is in this zone that these types reach the maximum quality and volume. The red alder sawtimber stands of coastal Lincoln County are, from the standpoint of quality and volume, among the best to be found in Oregon. Types in which Douglas-fir is the most abundant species occur infrequently in this zone, although this species is found occasionally as an associate in the hemlock-spruce types.

The second and larger zone within the county includes all area between the coastal zone and the eastern boundary. In this zone Douglas-fir types predominate. Hemlock occurs frequently as a subsidiary species, and in the Stott-Saddleback Mountain area occurs in fairly extensive pure stands. Hardwood types, again principally red alder, occur in the bottoms and on cutover areas.

Stand-Size Classes

Despite a fairly long history of cutting in the county, sawtimber stands occupy 404 thousand acres or 70 percent of the commercial forest area in the county[3/]. There has been no cutting on 80 percent of the sawtimber acreage; on the remaining 20 percent the stands have been partially cut. Of this area, the stands on 303 thousand acres are classified as large sawtimber; i.e., with the volume predominantly in trees more than 21 inches d.b.h. The remaining 101 thousand acres are stocked with small sawtimber stands in which the trees are from 11 to 20 inches d.b.h.



STAND SIZE	THOUSAND ACRES	PERCENT
SAWTIMBER	404	70
POLETIMBER	60	10
SEEDLINGS & SAPLINGS	86	15
NONSTOCKED	28	5
TOTAL	578	100

3/ Sawtimber stands, by Forest Survey standards, have a minimum net volume per acre as follows: 5,000 board-feet, log scale, International $\frac{1}{4}$-inch rule, in softwood species; in stands of hardwood species the minimum is 1,500 board-feet.

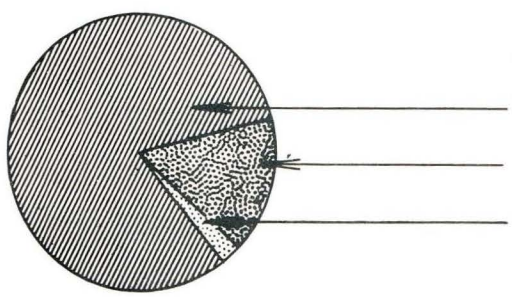
Cutting of timber in the past has been concentrated on private lands because of age class of timber and greater accessibility. Private forest lands include 144 thousand acres of uncut sawtimber, 72 thousand acres of partially cut sawtimber stands, 124 thousand acres of young timber under sawtimber size, and 26 thousand acres of nonstocked areas. Sawtimber stands on public lands are generally of thrifty young timber in which there has been little cutting to date.

Of the combined area of poletimber and seedling and sapling stands, totaling 146 thousand acres, 110 thousand acres are restocked logged-over lands; most of the remaining acreage consists of restocked burns. Stands on two-thirds of the acreage of restocked logged-over land are composed principally of softwood species; those on one-third are predominantly of the hardwood species, red alder.

Eighty-eight percent of the nonstocked area is recent clear-cut land (logged since 1949), 2 percent is earlier clear-cut land, and 10 percent is area deforested by fire.

Stocking of Young-Growth Stands

Most of the young-growth stands in the county are adequately stocked. Ninety-eight percent of the combined acreage of young-growth sawtimber, poletimber, and seedlings and saplings, is occupied by medium or well-stocked stands. Only 2 percent of the acreage is poorly stocked.



STOCKING CLASS	THOUSAND ACRES	PERCENT
WELL	381	82
MEDIUM	72	16
POOR	9	2
TOTAL	462	100

About 95 percent of the acreage of young-growth sawtimber stands is well stocked. Of the acreage of poletimber stands, 76 percent is well stocked and 24 percent medium stocked. Forty percent of the seedling and sapling area is well stocked and 50 percent medium stocked.

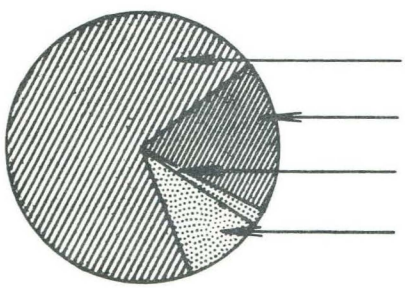
In classifying young-growth stands for stocking, all commercial tree species of all sizes are considered. Thus, a young-growth sawtimber stand may be classed as well stocked on the basis of sawtimber trees, poles, seedlings and saplings, or any combination of these tree sizes. Also, both softwood and hardwood species are included in the stocking. Red alder is an associate species on much of the acreage of young stands of hemlock, spruce, and Douglas-fir.

COMMERCIAL FOREST LAND TIMBER VOLUMES

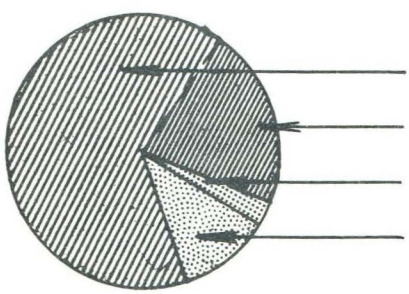
The net volume of live sawtimber trees (11.0 inches d.b.h. and larger) on commercial forest land is estimated to be 20,522 million board-feet, log scale, Scribner rule, or 22,112 million board-feet, International $\frac{1}{4}$-inch rule. Of the total Scribner volume, 20,355 million board-feet or 99 percent is in sawtimber stands; the remaining 167 million board-feet is in scattered sawtimber trees in the overstory of poletimber and seedling and sapling stands.

Species

The live sawtimber volume (Scribner) of softwood species totals 18,683 million board-feet; the volume of hardwood species amounts to 1,839 million board-feet. The dominant species, Douglas-fir, western hemlock, and Sitka spruce, account for 89 percent of the total volume in the county. The other softwoods--western redcedar, Pacific silver fir, noble fir, and lodgepole pine--combined, contain 2 percent of the volume. Red alder comprises the bulk of the hardwood volume; there is a small amount of bigleaf maple.



SPECIES	SAWTIMBER MILLION BD.-FT. (Scribner)	PERCENT
DOUGLAS-FIR	14,330	70
HEMLOCK AND SPRUCE	3,841	19
OTHER SOFTWOODS	512	2
HARDWOODS	1,839	9
TOTAL	20,522	100

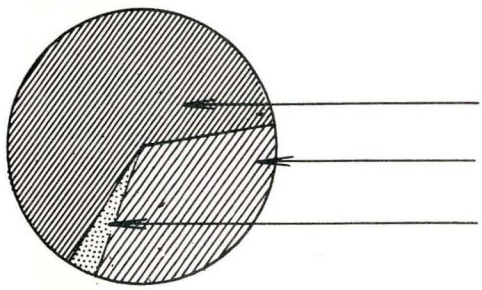


SPECIES	GROWING STOCK MILLION CU. FT.	PERCENT
DOUGLAS-FIR	2,116	64
HEMLOCK AND SPRUCE	705	21
OTHER SOFTWOODS	95	3
HARDWOODS	409	12
TOTAL	3,325	100

Growing-stock volume includes poletimber-size trees 5.0 to 10.9 inches in diameter, and sawtimber-size trees 11.0 inches and larger, all to a minimum 4-inch top inside bark. Of the total growing stock, only 3 percent, by volume, is in poletimber trees; the remainder is in sawtimber trees.

FOREST OWNERSHIP

Private individuals and corporations own five-eighths of the commercial forest land; the remaining three-eighths is publicly owned.



OWNERSHIP CLASS	THOUSAND ACRES	PERCENT
PRIVATE	366	63
FEDERAL	191	33
OTHER PUBLIC	21	4
TOTAL	578	100

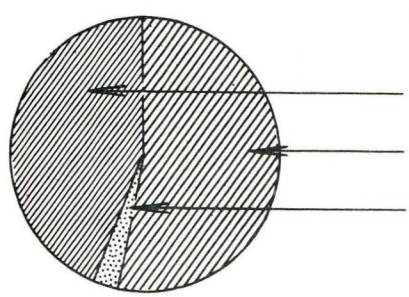
In the distribution of the private forest acreage by size class of owner there are 11 corporations that hold 5,000 acres or more in the county; their combined acreage is 180 thousand acres, nearly one-half of the total private acreage. There are more than 1,500 private owners in the less than 5,000-acre class; together they own 186 thousand acres.

Of the federally owned commercial forest area, a total of 166 thousand acres is national forest land in the Siuslaw National Forest. The bulk of this is in the southern one-third of the county; there is a small unit in the northern portion. In general, the continuity of the national forest land is broken by a large number of small private ownerships.

Federally owned forest area managed by the Bureau of Land Management totals 25 thousand acres and includes public domain and revested grant lands; most of the acreage is in small scattered tracts.

The 21 thousand acres in "other public" ownership is largely State owned; there is a small acreage each in municipal and county ownerships.

Sawtimber Volume



OWNERSHIP CLASS	MILLION BD.-FT. (Scribner)	PERCENT
PRIVATE	9,261	45
FEDERAL	10,602	52
OTHER PUBLIC	659	3
TOTAL	20,522	100

FOREST UTILIZATION

Prior to the early 1920's utilization of the forest resource in Lincoln County was limited, very largely, to supplying local demands for lumber, shingles, piling, fence posts, and fuelwood. Small amounts of lumber were shipped at times from Yaquina Bay to California markets in coastal schooners.

During World War I the demand for Sitka spruce for aircraft lumber focused attention on the spruce stands of the county and caused the Federal Government, through the Spruce Production Division, to start a fairly large logging and milling operation. This operation involved the purchase of a large tract of timber, principally spruce, construction of a railroad south from Newport and paralleling the coast, and construction of a sawmill at Toledo. Other fairly large-scale logging operations began in the late 1920's chiefly in the lower Siletz River drainage. However, greatest expansion of logging activity has come since 1938. This expansion has come as a result of, first, the development and wide use of truck transportation of logs which made feasible the opening up of large tracts of old-growth fir in the drainage of the Siletz and Salmon Rivers and, secondly, the war-created market for lumber and other products.

Statistics on saw log production, beginning with 1925, indicate the trend of logging activity. During the period 1925-29 the average annual cut of logs was 145 million board-feet Scribner. During the next five years, 1930-34, when depressed economic conditions prevailed, the average annual cut dropped to 67 million feet. The next half decade, 1935-39, saw a gradual increase in all but one year, 1938, and average production equaled that of the late 1920's--145 million feet. Rapid expansion of logging operations in the next few years produced an average annual cut of 270 million feet during the 3 years, 1940-42, with a peak production of 316 million feet in 1942. The average annual cut during the 4 years, 1952 through 1955, was 495 million board-feet, with a high of 511 million board-feet in 1955.

Production of hardwood sawlogs during the 18-year period 1925-42 averaged only about a quarter of a million board-feet annually. For several years during the period no hardwood logs were reported cut. The largest cut was in 1942 when a total of about 2 million board-feet of logs, chiefly red alder, was cut to supply expanding alder sawmilling operations in the county. The annual cut of hardwood for the 1952-55 period was 495 thousand board-feet, with a peak in 1952 of 512 thousand board-feet.

Table 1.--Land area by major class of land, 1955

Class of land	Area
	Acres
Forest:	
Commercial	577,670
Noncommercial:	
Productive-reserved	470
Unproductive	--
Total	578,140
Nonforest	48,750
All classes	626,890

Table 2.--Area of commercial forest land by ownership and stand-size classes, 1955

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Nonstocked areas
			Acres		
Private	366,030	216,090	49,620	74,190	26,140
State	19,560	14,790	1,870	2,630	270
County	100	--	60	40	--
Municipal	980	590	50	310	30
Federal:					
Bur. of Land Mgt.	25,230	22,020	2,160	700	350
National Forest	165,770	150,300	5,590	8,380	1,500
Total Federal	191,000	172,320	7,750	9,080	1,850
All ownerships	577,670	403,790	59,350	86,240	28,290

Table 3.--Area of commercial forest land by major forest type, and stand-size classes, 1955

Forest type	Total	Sawtimber stands		Pole-timber stands	Seedling and sapling stands	Non-stocked areas
		Large[1]	Small[2]			
			Acres			
Douglas-fir	325,930	237,940	33,180	30,950	23,860	
Hemlock-Sitka spruce	121,880	63,840	10,810	11,780	35,450	
Lodgepole pine	2,970	--	400	1,550	1,020	
Fir-spruce	1,580	1,430	--	--	150	
Hardwoods	97,020	--	56,190	15,070	25,760	
Nonstocked areas	28,290	--	--	--	--	28,290
Total	577,670	303,180	100,610	59,350	86,240	28,290

1/ 21 inches d.b.h. and larger.

2/ 11 to 21 inches d.b.h.

Table 4.--Land area by cover type, ownership class, and land-use class, 1955

Cover type	Total unreserved and reserved	Unreserved								Reserved	
		Total	Private	State	County	Municipal	Federal: Bureau of Land Mgt.	Federal: National forest	Federal: Other 1/	Total	State
PRODUCTIVE FOREST LAND											
		Commercial								Noncommercial Productive-reserved	
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Douglas-fir, large old-growth sawtimber (yellow fir)	22,950	22,730	19,040	--	--	--	470	3,220	--	220	220
Douglas-fir, large young-growth sawtimber (red fir)	215,140	215,140	72,520	10,500	--	280	13,550	118,290	--	--	--
Douglas-fir, small young-growth sawtimber (red fir)	33,180	33,180	19,590	1,410	--	10	4,460	7,710	--	--	--
Douglas-fir, poletimber	31,120	30,950	25,270	1,540	--	--	1,810	2,330	--	170	170
Douglas-fir, seedlings and saplings	23,860	23,860	17,620	2,300	--	--	590	3,350	--	--	--
Western hemlock, large sawtimber	41,420	41,410	31,910	--	--	--	900	8,600	--	10	10
Western hemlock, small sawtimber	7,910	7,910	5,460	--	--	170	1,060	1,220	--	--	--
Western hemlock, poletimber	9,960	9,960	7,810	--	30	--	130	1,990	--	--	--
Western hemlock, seedlings and saplings	32,500	32,490	30,360	60	--	40	50	1,980	--	10	10
Sitka spruce, large sawtimber	22,440	22,430	19,460	210	--	80	300	2,380	--	10	10
Sitka spruce, small sawtimber	2,900	2,900	2,800	--	--	50	--	50	--	--	--
Sitka spruce, poletimber	1,820	1,820	1,780	40	--	--	--	--	--	--	--
Sitka spruce, seedlings and saplings	2,980	2,960	2,820	--	--	130	10	--	--	20	20
Western redcedar, large sawtimber	70	70	70	--	--	--	--	--	--	--	--
True fir-mountain hemlock, large sawtimber	1,430	1,430	1,430	--	--	--	--	--	--	--	--
True fir-mountain hemlock, seedlings and saplings	150	150	150	--	--	--	--	--	--	--	--
Lodgepole pine, small sawtimber	400	400	400	--	--	--	--	--	--	--	--
Lodgepole pine, poletimber	1,550	1,550	1,500	--	--	50	--	--	--	--	--
Lodgepole pine, seedlings and saplings	1,020	1,020	810	--	--	70	--	140	--	--	--
Hardwood, small sawtimber	56,190	56,190	43,410	2,670	--	--	1,280	8,830	--	--	--
Hardwood, poletimber	15,100	15,070	13,260	290	30	--	220	1,270	--	30	30
Hardwood, seedlings and saplings	25,760	25,760	22,420	270	40	70	50	2,910	--	--	--
Recent clear-cut area, nonstocked	24,980	24,980	23,060	180	--	30	250	1,460	--	--	--
Old clear-cut area, nonstocked	510	510	510	--	--	--	--	--	--	--	--
Area deforested by fire, nonstocked	2,800	2,800	2,570	90	--	--	100	40	--	--	--
Total	578,140	577,670	366,030	19,560	100	980	25,230	165,770	--	470	470
NONFOREST LAND											
Agriculture	33,250	33,250	32,190	140	--	40	40	840	--	--	--
Grass and brush	4,380	4,310	3,310	450	--	10	100	430	10	70	70
Open--nonvegetative	11,120	11,060	10,600	40	--	340	--	80	--	60	60
Total	48,750	48,620	46,100	630	--	390	140	1,350	10	130	130
ALL LANDS											
Forest land:											
Commercial	577,670	577,670	366,030	19,560	100	980	25,230	165,770	--	--	--
Noncommercial (productive-reserved)	470	--	--	--	--	--	--	--	--	470	470
Total	578,140	577,670	366,030	19,560	100	980	25,230	165,770	--	470	470
Nonforest land	48,750	48,620	46,100	630	--	390	140	1,350	10	130	130
Total all land	626,890	626,290	412,130	20,190	100	1,370	25,370	167,120	10	600	600

1/ Lighthouse Reserve.

Table 5.--Area of commercial forest land by forest-condition and ownership class, 1955

Forest-condition class	Total	Private	State	County	Muni-cipal	Federal	
						Bureau of Land Mgt.	National forest
				Acres			
Softwoods, large sawtimber							
Uncut	263,740	111,280	7,390	--	360	13,920	130,790
Partially cut	39,470	33,150	3,320	--	--	1,300	1,700
Total	303,210	144,430	10,710	--	360	15,220	132,490
Softwoods, small sawtimber							
Uncut	25,870	11,510	900	--	50	5,320	8,090
Partially cut	18,520	16,740	510	--	180	200	890
Total	44,390	28,250	1,410	--	230	5,520	8,980
Softwoods, poletimber							
On cutovers	33,260	29,700	480	30	--	470	2,580
On other	11,020	6,660	1,100	--	50	1,470	1,740
Total	44,280	36,360	1,580	30	50	1,940	4,320
Softwoods, seedlings & saplings							
On cutovers	52,400	47,230	210	--	120	340	4,500
On other	8,080	4,530	2,150	--	120	310	970
Total	60,480	51,760	2,360	--	240	650	5,470
Hardwoods	97,020	79,090	3,230	70	70	1,550	13,010
Nonstocked	28,290	26,140	270	--	30	350	1,500
Total	577,670	366,030	19,560	100	980	25,230	165,770

Table 6.--Area of young-growth timber stands on commercial forest land, by stocking class, species group, and stand-size class, 1955

Stocking class and species group	Total	Sawtimber		Pole-timber	Seedlings and saplings
		Large 1/ young growth	Small young growth		
		Acres			
Well stocked:					
Softwoods	310,420	214,170	37,620	34,000	24,630
Hardwoods	70,540	--	49,250	11,060	10,230
Total	380,960	214,170	86,870	45,060	34,860
Medium stocked:					
Softwoods	48,870	970	6,330	10,140	31,430
Hardwoods	22,700	--	6,790	3,970	11,940
Total	71,570	970	13,120	14,110	43,370
Poorly stocked:					
Softwoods	5,000	--	440	140	4,420
Hardwoods	3,780	--	150	40	3,590
Total	8,780	--	590	180	8,010
All classes:					
Softwoods	364,290	215,140	44,390	44,280	60,480
Hardwoods	97,020	--	56,190	15,070	25,760
Total	461,310	215,140	100,580	59,350	86,240

1/ Includes only the stands classified and mapped as Douglas-fir large young-growth sawtimber type.

Table 7.--Net volume of live sawtimber and growing stock on commercial forest land, by ownership class, 1955

Ownership class	Live sawtimber		Growing stock
	Million board-feet, log scale, Scribner rule	Million board-feet, International ¼-inch rule	Million cubic feet
Private	9,262	9,990	1,555
State	635	684	106
County	1/	1/	1/
Municipal	24	26	4
Federally owned or managed:			
Bur. of Land Mgt.	937	1,010	156
National Forest	9,664	10,402	1,504
Total Federal	10,601	11,412	1,660
All ownerships	20,522	22,112	3,325

Table 8.--Net volume of live sawtimber and growing stock on commercial forest land, by stand-size class, 1955

Stand-size class	Live sawtimber		Growing stock
	Million board-feet, log scale, Scribner rule	Million board-feet, International $\frac{1}{4}$-inch rule	Million cubic feet
Sawtimber stands	20,355	21,921	3,255
Poletimber stands	160	183	69
Seedling and sapling stands	6	7	1
Nonstocked areas	1	1	1/
Total	20,522	22,112	3,325

1/ Less than .5 million.

Table 9.--Net volume of live sawtimber and growing stock on commercial forest land, by species, 1955

Species	Live sawtimber		Growing stock
	Million board-feet, log scale, Scribner rule	Million board-feet, International ¼-inch rule	Million cubic feet
Softwoods:			
Douglas-fir	14,330	15,320	2,116
Western hemlock	2,872	3,101	527
Sitka spruce	969	1,028	178
Western redcedar	251	266	47
Pacific silver fir	197	213	35
Noble fir	57	61	10
Lodgepole pine	7	8	3
Total	18,683	19,997	2,916
Hardwoods:			
Red alder	1,713	1,970	383
Bigleaf maple	126	145	26
Total	1,839	2,115	409
All species	20,522	22,112	3,325

Table 10.--Net volume of live sawtimber on commercial forest land, by diameter class and species groups, 1955

Diameter class and log rule	Total	Douglas-fir	Western hemlock	Sitka spruce	Other softwoods	Hardwoods
	Million board-feet					
11.0" to 20.9" d.b.h.						
Scribner rule	3,369	1,264	592	125	51	1,337
International ¼-inch rule	3,830	1,466	639	132	55	1,538
21.0" to 30.9" d.b.h.						
Scribner rule	6,172	4,424	1,086	171	80	411
International ¼-inch rule	6,692	4,778	1,173	182	86	473
31.0" to 40.9" d.b.h.						
Scribner rule	5,424	4,410	655	150	155	54
International ¼-inch rule	5,770	4,674	708	159	167	62
41.0" d.b.h. and larger						
Scribner rule	5,557	4,232	539	523	226	37
International ¼-inch rule	5,820	4,402	581	555	240	42
All diameter classes						
Scribner rule	20,522	14,330	2,872	969	512	1,839
International ¼-inch rule	22,112	15,320	3,101	1,028	548	2,115

Table 11.--Net volume of all timber on commercial forest land, by class of material and species group, 1955

Class of material	Total	Softwoods	Hardwoods
	Million cubic feet		
Growing stock:			
Sawtimber trees:			
Sawlog portion	2,993	2,660	333
Upper stem portion	225	200	25
Total	3,218	2,860	358
Poletimber trees	107	56	51
Total growing stock	3,325	2,916	409
Other material:			
Sound cull trees	32	1/	32
Rotten cull trees	11	8	3
Salvable dead trees	43	43	1/
Total other material	86	51	35
All timber	3,411	2,967	444

1/ Less than .5 million.

Table 12.--Average annual cut of live sawtimber and growing stock on commercial forest land, by species group for the period 1952-55

Species group	Live sawtimber						Growing stock		
	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/
	Thousand board-feet, log scale, Scribner rule			Thousand board-feet, International $\frac{1}{4}$-inch rule			Thousand cubic feet		
Softwoods	450,106	43,930	494,036	483,864	47,225	531,089	78,279	7,883	86,162
Hardwoods	451	44	495	519	50	569	90	9	99
Total	450,557	43,974	494,531	484,383	47,275	531,658	78,369	7,892	86,261

1/ Annual cut is the sum of timber products and logging residues.

FOREST SURVEY PROCEDURE

The procedures used in the second Forest Survey reinventory of the forests of Lincoln County were materially different from the procedures used in the initial inventory and first reinventory. This change in procedures accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of procedures used in each inventory is in order.

INITIAL INVENTORY

The initial inventory of the county's forests was conducted in 1931 and 1932 by what is known as the "compilation method." In this method existing information on forest types, timber cruises, and other pertinent data were collected from private timber owners and various public agencies. These data were checked in the field for reliability and, in case of timber cruises, they were adjusted to the specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by existing information were obtained through intensive field reconnaissance. Timber-volume estimates for immature stands were determined from normal yield tables adjusted for site, age, and density of stand.

All land in the county was classified as either forest or nonforest. Forest land was further classified as commercial or noncommercial; the commercial forest land was still further classified by type, stand-size class, and, in case of young-growth stands, by stocking and age classes. These types and classes were delineated on 1-inch-to-the-mile base maps of each township. These township type maps were then superimposed over ownership-status plats and dot-counted to obtain forest-type-area statistics by ownership class. Type delineations on the township maps were traced on a base map of the county to form a county forest type map.

FIRST REINVENTORY

The first reinventory, in 1942, included a complete revision of the forest type map of the county. For this revision records of cutting and other forms of drain, since the original inventory, were obtained from various sources and verified in the field by ground reconnaissance. Areas on which the type had changed due to cutting, restocking of cutover or burned-over land, and ingrowth of immature stands were remapped on the ground. The ownership status was brought up to date. On the basis of the new ownership data and the revised forest type map, area statistics by forest types were recomputed. The statistical report was issued March 1944.

Timber-volume estimates for mature sawtimber stands were based on cruise data collected during the original survey, adjusted for cutting and other drain that had occurred during the interval between inventories. Volume estimates for immature stands were based on yield tables adjusted for site, age, and density of stand.

SECOND REINVENTORY

In the second reinventory, in 1955, the forest type map was again completely revised. This revision was accomplished through interpretation, classification, and field mapping on aerial photos covering all of the land area. In the mapping on aerial photos, types whose classification was difficult were examined more closely in the field. Likewise, species composition of mixed stands was checked on the ground. The use of aerial photos in mapping resulted in type delineations of much greater accuracy and detail than were possible through the ground reconnaissance employed in the initial inventory and first reinventory. In the preparation of a revised type map, the delineations on the aerial photos were transferred to a 2-inch county base map through use of a reflecting projector. The new type map was then superimposed over a current ownership map of complete county coverage and a dot count made of forest type areas by ownership class.

Volume estimates for live sawtimber, growing stock, and salvable dead material were calculated by applying average per-acre volumes to the appropriate forest type acreages. The average-per-acre volumes for sawtimber stands and poletimber stands were obtained through a sampling procedure in which the stands were measured on randomly selected plots. In the random selection of samples each individual sawtimber or poletimber stand in the county had a chance of being selected. A sample consisted of a cluster of 3 one-fifth-acre circular plots spaced at regular 6-chain intervals. Intensity of the sampling was designed to produce a total estimate of volume in the county of a specified sampling accuracy set by Forest Survey.

Average-per-acre volumes of sawtimber and poletimber trees in the overstory of seedling and sapling stands and on nonstocked areas were obtained through an aerial photo plot sampling procedure. One-acre photo plots were located by a modified systematic-random pattern. By photo interpretation, estimates were made of average number of trees per acre of both sawtimber and poletimber size, average crown diameter, and total tree height. Gross volume of the average tree was obtained from photo volume tables and then adjusted for defect and breakage in order to obtain net volume.

ACCURACY OF 1955 REINVENTORY DATA

FOREST AREA

In the reinventory of the county, in-place mapping of the forests and their classification by forest type, stand-size class, and condition class, were based on 100-percent coverage. Thus no error due to sampling was involved. Errors due to techniques or judgment in the field and in office computation of data were possible, but difficult to evaluate. Throughout all phases of the work, however, close supervision and frequent checks assured a high level of accuracy and uniformity of standards.

TIMBER VOLUME

The chances are 19 out of 20 that the board-foot volume of live sawtimber, if measured by a 100-percent cruise, would be within plus or minus 9.3 percent of the estimated total of 20,522 million board-feet, log scale, Scribner rule. On the same basis, cubic-foot volume of growing stock from a 100-percent cruise would be within a range of plus or minus 8.9 percent of the estimated 3,325 million cubic feet. Volume estimates by species, stand-size class, and other subdivisions are subject to greater sampling errors.

DIFFERENCE IN RESULTS OF INVENTORIES

Some of the differences in forest-type and timber-volume statistics resulting from the initial inventory and first reinventory, and those obtained in the second reinventory are due to actual physical change such as the cutting of stands, restocking of deforested areas, and ingrowth of stands into the next larger size class. Other differences are due to variations between inventories in the procedures used in interpretation and classification of forest conditions and in standards of utilization. Differences such as these preclude direct comparison of some of the statistics; comparison of other statistics is meaningful only after the statistics have been adjusted to common standards.

FOREST AREA

The forest land areas, classified by stand-size and condition classes, resulting from the three inventories, are shown in the table below:

Table 13.--Comparison of forest area statistics; initial inventory, first and second reinventories

Inventory	Total forest land	Commercial forest land					Noncommercial forest land
		Total	Saw-timber	Pole-timber	Seedlings and saplings	Non-stocked area	
	Thousands of acres						
1932	576	571	350	95	47	79	5
1942	587	581	342	120	32	87	6
1955	578	578	404	60	86	28	1/

1/ Less than 500 acres.

With the exception of seedling and sapling stands and nonstocked areas, the acreages shown in table 13 have been adjusted to fit 1955 specifications and are comparable in that respect. The 1932 and 1942 poletimber acreages have been adjusted to include only stands comprised of trees 5.0 to 10.9 inches d.b.h. Similarly, sawtimber acreages for 1932 and 1942 have been adjusted to include only stands comprised of trees over 11.0 inches d.b.h.

Seedling and sapling acreages for all three inventories include stands of trees 0 to 4.9 inches d.b.h., but the 1932 and 1942 acreages do not include any part of the areas clear-cut in the 12 years previous to inventory; such areas were included in the nonstocked class. The 1955 seedling and sapling acreage does include all cutover areas, however recent, which were stocked at the time of reinventory.

Acreages of nonstocked land shown in the three inventories vary in a manner directly complementary to the above-discussed differences in seedling and sapling acreages.

Analysis of the sawtimber acreages for the three inventories shows the area of old-growth Douglas-fir stands (trees more than 180 years old) to have been 86 thousand acres in 1932, 61 thousand acres in 1942, and about 23 thousand acres in 1955.

Boundary line relocation between Lincoln and Benton Counties caused a decrease of 11 thousand acres in the total area of the county between the 1942 and 1955 inventories. The acreage lost to Benton County was almost all forest land and amounted to about 2 percent of the total forest land area.

Between 1942 and 1955 the area of commercial forest land in private ownership increased 73 thousand acres, a 25-percent increase. This new private acreage was of lands that were in county and Indian

ownerships in 1942. During the 13-year period the acreage in county ownership was reduced from 69 thousand acres to a mere 1 hundred acres; 8 thousand acres of Indian land passed into private ownership. The acreage in State ownership remained about the same and that federally owned was decreased a few thousand acres.

TIMBER VOLUME

The three estimates of sawtimber volume on commercial forest land are shown in the tabulation below:

Inventory	Total	Douglas-fir	Other species
	Million bd.-ft., log scale, Scribner rule		
1932[3/]	14,950	10,406	4,544
1942[3/]	14,073	11,342	2,731
1955	20,522	14,330	6,192

The 1932 and 1942 volume estimates were based on adjusted private cruises and ocular estimates of old-growth timber and yield-table values for young timber. A completely new independent estimate made in 1955 is described on page 21.

Some differences in volume estimates between the first two inventories and the last one are due to differences in survey techniques, procedures, and methods. The effects of these differences on volume estimates cannot be measured. The 1955 volume estimate has a calculated sampling error (page 22). However, no statistical evaluation of the accuracy of the 1932 and 1942 estimates can be made.

Another cause of the difference in volumes may have been the variation in standards of utilization between inventories. The standards for Douglas-fir, western hemlock, and Sitka spruce, were changed between surveys to recognize increased industrial use of these species. In 1955, volume tables were used that gave a materially greater volume for a tree of a given size than did the tables used in the earlier inventories. Other changes included lowering the minimum merchantable top diameter of sawtimber trees, and reducing the minimum requirement of net sound volume in a sawtimber tree from 33-1/3 to 25 percent of gross volume.

One factor that increased the board-foot volume of sawtimber during the years between inventories was forest growth--net growth in sawtimber trees and the ingrowth of poletimber trees into the sawtimber class. Because of the large acreage of young stands both of sawtimber and poletimber size, growth was a very important factor in the increase in volume. An offsetting factor causing a reduction in the sawtimber inventory was drain due to timber cutting

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3/ Volume estimates adjusted to same d.b.h. and top diameter limits as were used in 1955.

and to the various natural depleting agencies, such as forest insects, diseases, windthrow, and fire.

Because of the influence of these and possibly other factors, the three inventory estimates are not comparable and do not necessarily reflect a trend in the county's total volume of sawtimber.

DEFINITION OF TERMS USED

LAND AREA

Total Land Area

Includes dry land and unmeandered water surface.

Forest Land Area

Includes (a) land which is at least 10-percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in (a) have been removed to less than 10-percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the county is 10 acres.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the county is 10 acres.

FOREST LAND CLASSES

Commercial Forest Land Area

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land, and (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Forest Land Types

Forest land is typed on the basis of predominant species as indicated by cubic volume for sawtimber and poletimber stands, and number of trees for seedling and sapling stands, or as a forest condition such as nonstocked cutover, or burned-over land. Where none of the indicated species comprises 50 percent or more of a given stand, the stand is typed on the basis of plurality of cubic volume or number of trees. In classifying forest land by type the minimum area recognized is 40 acres.

Commercial Forest Land

Major forest types. Local forest types are grouped into generalized types. The major forest types in Lincoln County are as follows:

Douglas-fir. Forests in which 50 percent or more of the stand is Douglas-fir.

Hemlock-Sitka spruce. Forests in which 50 percent or more of the stand is hemlock or Sitka spruce.

Fir-spruce. Forests in which 50 percent or more of the stand is true fir.

Lodgepole pine. Forests in which 50 percent or more of the stand is in lodgepole pine.

Hardwood. Forests in which 50 percent or more of the stand is red alder, bigleaf maple, or other western hardwoods, singly or in combination.

Noncommercial Forest Land

Productive-reserved. Forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Nonforest Land Types

Agricultural. Cultivated land or stump pasture.

Grass and brush. Grass or brush on nonforest land.

Open-nonvegetative. Includes barrens, tideflats, towns, and unmeandered water.

TREE CLASSES

Sawtimber Tree

Tree of commercial species, 11 inches d.b.h. or larger, that contains at least one 16-foot coniferous sawlog or one 8-foot hardwood sawlog to a variable top diameter never less than 8 inches inside the bark. Also, 25 percent or more of the gross board-foot volume must be free from rot or defect.

Poletimber Tree

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. of commercial species in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Seedling and Sapling Trees

Live trees of commercial species less than 5.0 inches d.b.h. and of good form and vigor.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable, now or prospectively, because of defect, rot, or species.

Sound cull tree. Live tree of sawtimber or poletimber size which contains 25 percent or more of sound volume but will not make at least one merchantable log, now or prospectively, because of roughness or poor form.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Salvable Dead Tree

Standing dead or down tree which contains 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 8-foot hardwood log.

STAND-SIZE CLASSES

Sawtimber Stand

Stand of sawtimber trees having a minimum net volume per acre as follows: 5,000 board-feet, log scale, International $\frac{1}{4}$-inch rule, in any species except hardwoods; 1,500 board-feet in hardwoods.

Large sawtimber stand. Stand in which the majority of the volume is in trees more than 21.0" d.b.h.

Small sawtimber stand. Stand in which the majority of the volume is in trees from 11.0" to 20.9" d.b.h.

Poletimber Stand

Stand failing to meet sawtimber-stand specifications but at least 10-percent stocked with poletimber and larger (5.0" d.b.h. and larger) trees and at least half the minimum stocking in poletimber trees.

Seedling and Sapling Stand

Stand not qualifying as either sawtimber or poletimber stand but having at least 10-percent stocking of trees of commercial species and with at least half the minimum stocking in seedling and sapling trees.

Uncut Sawtimber Stand

Sawtimber stand that is essentially undisturbed by cutting.

Residual Sawtimber Stand

Sawtimber stand in which a partial harvest has been made, and in which the residual volume amounts to 5,000 board-feet or more per acre for softwoods and 1,500 board-feet for hardwood stands.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Degree of stocking" is synonymous with "percent of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criterion, or combination of criteria.

Well-stocked stands. Stands that are 70 percent or more stocked with present or potential growing stock trees.

Medium-stocked stands. Stands that are 40 to 69 percent stocked with present or potential growing stock trees.

Poorly stocked stands. Stands that are 10 to 39 percent stocked with present or potential growing stock trees.

Nonstocked areas. Areas that are 0 to 10 percent stocked with present or potential growing-stock trees.

TIMBER VOLUME

Live Sawtimber Volume

Net volume in board-feet of live sawtimber trees of commercial species.

Scribner rule. The common board-foot rule used in determining log-scale volume of sawtimber in the Pacific Northwest.

International $\frac{1}{4}$-inch rule. The standard board-foot rule adopted nationally by the Forest Service in the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top inside bark.

Tree Species

Tree species commonly found in Lincoln County include:

Softwoods:
- Douglas-fir (*Pseudotsuga menziesii*)
- Western hemlock (*Tsuga heterophylla*)
- Sitka spruce (*Picea sitchensis*)
- Western redcedar (*Thuja plicata*)
- Pacific silver fir (*Abies amabilis*)
- Noble fir (*Abies procera*)
- Lodgepole pine (*Pinus contorta*)

Hardwoods: Red alder (Alnus rubra)
Bigleaf maple (Acer macrophyllum)

TIMBER CUT

Annual Cut of Live Sawtimber

The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from live sawtimber. The volume of timber products cut from live sawtimber.

Logging residues from live sawtimber. The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land and not converted to timber products.

Annual Cut of Growing Stock

The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from growing stock. The volume of timber products cut from growing stock.

Logging residues from growing stock. The net cubic-foot volume of growing stock cut or killed by logging on commercial forest land and not converted to timber products.

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